



CASE REPORT

Major incident simulation in Rwanda: A report of two exercises

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Introduction

For healthcare responders, any incident where the location, number, severity or type of casualties require extra-ordinary resources, is a “major incident” [1]. Major incidents include all those events sometimes described as disasters, mass casualty incidents or multiple casualty incidents.

Several types of major incident have been reported in Rwanda, including fire, traffic accidents, lightning strikes, floods, earthquakes and landslides [2]. Service d'Aide Medicale Urgente (SAMU), Rwanda's Emergency Medical Service (EMS), has been at the forefront of medical major incident management [3], often working in conjunction with military medical services and Rwanda Red Cross (RRC).

Healthcare systems need to be thoroughly prepared for all hazards in order to respond appropriately to a major incident, in collaboration with other emergency services [1,4]. It has been shown that morbidity and mortality are reduced by appropriate training in hospital and prehospital management of major incidents [5]. Training and conduction of drills are essential for enabling first responders to be able to handle the challenges associated with major incidents [6].

One key aspect of successful management of a major incident is triage, the sorting of casualties according to priority for treatment and evacuation. Rwanda uses standard colour-coded categories for triage: red (category 1, for immediate treatment), yellow (category 2, for urgent treatment) and green (category 3, for delayed treatment) [1].

This paper describes two major incident drills that took place in Rwanda in 2017. The incidents are summarised in Table 1, according to the METHANE mnemonic used in the Major Incident Medical Management and Support (MIMMS) course [1]. METHANE is a standardised method to assess and report major incidents: Major incident, Exact location, Type of incident, Hazards, Access/egress, Number of casualties,

Emergency services. Both drills simulated multiple casualty incidents. The mobilisation of extra-ordinary resources was necessitated at the Karongi drill by the location (off-shore), and at the Kanombe drill by the large volume of casualties.

Karongi drill

This major incident exercise was conducted in Karongi district, Western Province of Rwanda. The aim of the exercise was to assess preparedness of the prehospital services, Kibuye District Hospital (KDH), and Centre Hospitalier Universitaire de Kigali (CHUK), the major referral and teaching hospital in the country. The drill was conducted as the culmination of a one-week training for prehospital staff in the region. Hospital administrators, but not clinical staff, were given advance notice of the drill.

The incident involved the simulated capsizing of a wooden transport boat, with 12 actors taking the role of casualties. The major incident was activated by calling the national emergency despatch number: SAMU, RRC and the military marine were mobilised, and KDH and CHUK put on standby. The RRC dinghy was a small rescue boat accommodating three personnel and three casualties, based 1 km away from the scene. Triage was initially performed as RRC personnel observed casualties in the water: swimmers were considered green/uninjured. The others were eyeballed to assess priority: casualties categorised as red included one polytrauma and one peri-arrest, and were retrieved into the dinghy together with a yellow casualty who was unable to hold onto the side of the dinghy. The other casualties waited in the water until the SAMU boat ambulance arrived from the marine base 10 km away. The SAMU boat crew comprised four military marine and four SAMU personnel, and could carry three stretchers or four seated patients. Cardiac arrest was simulated for one red patient in the

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Table 1
METHANE summary of major incident drills.

Major incident	Karongi drill	Kanombe drill
Exact location	Lake Kivu, 1 km off shore from Karongi (125 km from Kigali)	Kigali international Airport (less than 10 km from Kigali hospitals)
Type of incident	Boat capsized	Plane crash
Hazards	Water	Explosion, fire, debris
Access/egress	By boat from Red Cross base in Karongi (1km) and SAMU boat ambulance from military marine base (10 km). Land ambulance from those bases to hospitals.	Airport road, helicopter.
Number of casualties	12 (2 red, 4 yellow, 6 uninjured)	162 (10 red, 27 yellow, 67 green, 38 uninjured, 20 dead)
Emergency services	Military marine, Red Cross boat, SAMU boat ambulance, SAMU land ambulance.	Fire, police, ambulance, military, hospital response teams.

boat, and cardio-pulmonary resuscitation performed en route, using a resuscitation mannequin.

Although the hospitals had been given notice of the major incident by SAMU, there was a marked difference between the hospitals in disseminating that information to all relevant staff. In CHUK, WhatsApp™ was used to inform the emergency department group; this included lead nurses and all emergency medicine residents and faculty. In KDH there was no similar system, and there were significant delays in notifying staff: porters were the first to recognise incoming casualties, and had to seek medical staff for assistance.

The timeline for the drill is given in [Table 2](#).

Kanombe drill

The second major incident exercise was conducted at Kigali International Airport, following two months of preparation and training. The aims were to raise awareness, develop training and prepare for an all-service response to a mass casualty incident at the airport, and to assess the preparedness of the hospital response. The exercise involved airport fire, police and military staff, five SAMU and five RRC ambulances with a total of 30 staff, and four medical/nursing teams from Kigali hospitals with a total of five doctors and 12 nurses. All responders were at the airport when the drill began. The three referral hospitals in Kigali (CHUK; Rwanda Military Hospital, RMH; King Faisal Hospital, KFH) were put on standby to receive large numbers of

Table 2
Karongi drill timeline.

Time	Event
11:00	Boat capsized with 12 people overboard
11:01	Emergency services notified
11:04	SAMU boat ambulance and RRC dinghy mobilised, Karongi District Hospital (KDH) and Centre Hospitalier Universitaire de Kigali (CHUK) put on standby
11:10	RRC dinghy on scene
11:19	SAMU boat Ambulance on scene
11:27	SAMU boat ambulance departs scene with 2 red casualties RRC dinghy remains with 4 yellow casualties
11:42	SAMU boat ambulance arrives base, transfers casualties to 2 SAMU land ambulances
11:45	SAMU boat ambulance leaves base to return to scene
11:50	SAMU land ambulances depart for Karongi District Hospital (KDH)
11:55	SAMU land ambulances arrive KDH
12:00	SAMU boat ambulance on scene
12:05	SAMU boat ambulance departs scene with 4 yellow casualties RRC retrieves remaining 6 uninjured survivors, departs scene for RRC base
12:20	SAMU boat ambulance arrives base, transfers casualties to military minibus
12:22	RRC dinghy arrives base, unloads survivors
12:30	Minibus leaves marine base
12:35	Uninjured survivors assessed and discharged
12:40	Minibus arrives KDH
13:00	Stand down

casualties: they were not told it was a drill.

The exercise simulated an aeroplane crash, with 162 actors playing the roles of passengers and crew. Police established inner and outer cordons to demarcate ‘bronze’ and ‘silver’ areas of control. Patients were triaged by the medical/nursing teams using standard colour-coded categories and labels. Casualty-actors had been previously briefed as to what their injuries and abilities were. Casualties were asked to walk; if they could they were asked if they had any injuries. 67 walking injured casualties were triaged green, there were 38 uninjured. Ten non-walkers with obviously severe injuries or who didn’t respond to voice, were triaged as red; 20 were declared dead, and the other 27 triaged as yellow. Separate red, yellow and green areas made up the casualty clearing station (CCS), and a temporary mortuary was set up in the airport. Vital signs were allocated by ambulance staff in accordance with what they judged best fit the injuries sustained.

Casualties were evacuated by military helicopter to KFH, and by 10 ambulances to CHUK and RMH. The helicopter took a total of eight red and yellow, and 12 green casualties. CHUK took 15 red and yellow patients, RMH took 14. RRC evacuated the remaining green patients, distributed between the three hospitals. Each ambulance could accommodate one stretcher and one seated patient. Ten further ambulances were mobilised by SAMU and RRC during the response. On arrival at local hospitals, receiving staff were still not informed it was a drill. Head injured red casualties in coma were not immediately identified as being actors; in some cases discrepancies between the documented pre-hospital vital signs and those obtained in the emergency department were the first clue they had. Patients with make-up to simulate wounds were rapidly identified. The exercise concluded after the last casualties arrived at hospital.

The timeline for the drill is given in [Table 3](#).

Table 3
Kanombe drill timeline.

0840	Aeroplane crash on runway
Control tower declares major incident	
0843	Fire service on scene
0845	Police and pre-hospital teams on scene
0850	Triaging of casualties
0900	Helicopter makes first trip to King Faisal Hospital (KFH)
0903	SAMU ambulances depart for Centre Hospitalier Universitaire de Kigali (CHUK)
0905	SAMU ambulances depart for Rwanda Military Hospital (RMH)
From 0910	RRC ambulances depart for other hospitals, 10 further ambulances deployed by RRC and SAMU
1030	Last casualties arrive at hospital
1045	Stand down

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